



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/535,532	05/15/2006	Peter David Hood	17638-006US1 INTUE/P29548	1617
26161	7590	03/04/2008	EXAMINER	
FISH & RICHARDSON PC P.O. BOX 1022 MINNEAPOLIS, MN 55440-1022			KALAFUT, STEPHEN J	
			ART UNIT	PAPER NUMBER
			1795	
			MAIL DATE	DELIVERY MODE
			03/04/2008	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/535,532	Applicant(s) HOOD ET AL.	
	Examiner Stephen J. Kalafut	Art Unit 1795	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-19 is/are pending in the application.
 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1-6, 8-10 and 12-19 is/are rejected.
- 7) ☒ Claim(s) 7 and 11 is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 19 May 2005 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
 Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
 Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
 a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. ____.
 3. ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. ____. |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date <u>12/5/2002, 5/9/2005</u> . | 6) <input type="checkbox"/> Other: ____. |

Art Unit: 1795

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1, 3-5, 12, 13, 15 and 16 are rejected under 35 U.S.C. 102(b) as being anticipated by Yoshida *et al.* (JP 2002-075,427), cited by applicants.

Yoshida *et al.* a fuel cell system including a fuel cell stack (1), which includes a polymer electrolyte membrane (paragraph 0016), and through which a coolant is circulated via a coolant loop (10). The coolant may be water (paragraph 0027). Thus, the stack would thus have water inlet and outlet ports. The coolant loop includes a heat exchanger conduit (9) which goes through a thermal storage tank (8). This heat exchanger would thus be connected to the inlet and output port of the fuel cell stack. The product water of the fuel cell may also be used to provide some of the coolant (paragraph 0032). Thus, the inlet and outlet ports communicate with the membrane electrode assemblies of the fuel cell stack. Thus would also mean that the cathode exhaust would be a water outlet port. The fuel cell system also includes a water pump (11) between the heat exchanger outlet and fuel cell inlet. Since the thermal storage tank is full of water (paragraph 0018), which would form a water jacket around the heat exchanger. The tank includes a cold water inlet (12a) and a hot water draw off point (12b). Operating the system of Yoshida *et al.* would entail feeding fuel and oxidant into the fuel cell stack to generate electric current and water/water vapor by-product, feeding the water/water vapor into the heat exchanger within a thermal storage tank and extracting heat energy therefrom, retrieving the water and

Art Unit: 1795

condensed water vapor back into the fuel cell, storing extracted heat in the storage tank and the water jacket, and drawing off heated water while replacing it with incoming cold water.

Claims 1, 4, 13 and 15 are rejected under 35 U.S.C. 102(b) as being anticipated by Misumi (JP 2002-008690), cited by applicants.

Misumi discloses a fuel cell system including a fuel cell stack (3), which includes a polymer electrolyte membrane (paragraph 0004), and through which water is circulated via a coolant loop (4). Thus, the stack would thus have water inlet and outlet ports. Water from the cathode exhaust (29) is used to provide some of the coolant water. Thus, the inlet and outlet ports communicate with the membrane electrode assemblies of the fuel cell stack. The coolant loop also goes through a heat exchanger conduit (8) within a thermal storage tank (2). Thus, the heat exchanger would have an inlet and an outlet connected to the water inlet and outlet of the fuel cell, all on the same cooling circuit. The water within the tank would form a water jacket around the heat exchanger. Operation of the system of Misumi would entail feeding fuel and oxidant into the fuel cell stack to generate electric current and water/water vapor by-product, feeding the water/water vapor into the heat exchanger within a thermal storage tank and extracting heat energy therefrom, retrieving the water and condensed water vapor back into the fuel cell, and storing extracted heat in the storage tank and water jacket therein.

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person

Art Unit: 1795

having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 2 and 14 are rejected under 35 U.S.C. 103(a) as being unpatentable over either Yoshida *et al.* or Misumi, each in view of Bonville *et al.* (US 6,015,634).

Neither Yoshida *et al.* nor Misumi disclose a condensate collection unit in their respective cooling circuits, between the heat exchanger outlet and fuel cell inlet. Bonville *et al.* disclose a condensate collector (37), which stores water condensed from the cathode outlet (30) by a condenser (55), and which sends water into an inlet (36) on the fuel cell stack. Because this would recover product water to be used as coolant, it would be obvious to use the condensate collector of Bonville *et al.* in the coolant loops of either Yoshida *et al.* or Misumi, before the fuel cell inlet along the loop.

Claim 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over either Yoshida *et al.* or Misumi, each in view of Yokoie (JP 2000-018,718), cited by applicants.

Neither Yoshida *et al.* nor Misumi disclose a heating element for heating the water jacket. Yokoie discloses a fuel cell with a water tank (100) that may be heated either with a heat exchanger (110a) using the fuel cell coolant, or with an electric heating element (120). Because this electric heater would provide a backup to the heat exchanger when hot water is needed, it would be obvious to use the electric heating element of Yokoie in the hot water tanks of either Yoshida *et al.* or Misumi.

Art Unit: 1795

Claims 8 and 17 are rejected under 35 U.S.C. 103(a) as being unpatentable over either Yoshida *et al.* or Misumi, each in view of Vanderwees *et al.* (US 7,191,858).

Neither Yoshida *et al.* nor Misumi disclose a secondary water circuit passing through the storage tank, for use with a radiator. Vanderwees *et al.* disclose two liquid coolant loops, in heat exchange relationship, used to cool a fuel cell (column 3, lines 10-23), and which may be used to heat radiators (72, 74). To enable the heat of fuel cells of either Yoshida *et al.* or Misumi to be used outside the respective fuel cell system, it would be obvious to use a second coolant loop as taught by Vanderwees *et al.*, connected to the first coolant loop and water tanks of either Yoshida *et al.* or Misumi, and to connect the second loop to a radiator.

Claims 9 and 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over either Yoshida *et al.* or Misumi, each in view of Nelson *et al.* (US 6,777,120).

Neither Yoshida *et al.* nor Misumi disclose the inlet port of the fuel cell used to direct water injection of either or both electrodes. Nelson *et al.* teach the injection of water into the reactant inputs, and thus into the electrodes, to humidify a polymer electrolyte fuel cell (column 4, lines 12-18). Because the fuel cells of Yoshida *et al.* and Misumi are also of the polymer electrolyte type, they would likewise benefit from this humidification. For this reason, it would be obvious to use the water from the coolant systems of either Yoshida *et al.* or Misumi to humidify the reactants and electrodes of their fuel cells, as taught by Nelson *et al.*

Claims 10 and 19 are rejected under 35 U.S.C. 103(a) as being unpatentable over either Yoshida *et al.* or Misumi, each in view of Ballentine *et al.* (US 6,939,635).

Art Unit: 1795

Neither Yoshida *et al.* nor Misumi disclose the water inlet port of the fuel cell stack being used to preheat either or both of the incoming reactants. Ballentine *et al.* disclose heat from a coolant system being used to preheat incoming reactants (column 9, lines 33-37). Because this would enable the fuel cell to operate more efficiently since the fuel cell itself would not have to heat the incoming reactants, it would be obvious to use the coolant streams of either Yoshida *et al.* or Misumi to preheat the reactants entering their fuel cells, as taught by Ballentine *et al.*

Claims 7 and 11 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. The prior art, cited either herein or by applicants, does not disclose a fuel cell system with all the recited components of claims 1 and 5, along with a pressure regulation means for controllably exhausting waste gas from the cooling circuit, or with a valve coupled between the not water draw off point of the thermal storage tank and a waste water outlet, actuated in response to a temperature sensor upon excessive temperature.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Stephen J. Kalafut whose telephone number is 571-272-1286. The examiner can normally be reached on Mon-Fri 8:00 am-4:30 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Patrick J. Ryan can be reached on 571-272-1292. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Art Unit: 1795

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Stephen J. Kalafut/
Primary Examiner, Art Unit 1795